



# Abdominal Catastrophe in Crohn's Disease Surgery

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Crohn's disease, open abdomen, Negative Pressure Wound Therapy, enterocutaneous fistula

## Abstract

**Introduction.** Performing surgery on patients with Crohn's disease is a true challenge due to the elevated risk of complications related to the chronic proinflammatory response. Stenosis is the leading cause of intestinal resection in these patients.

**Case Report.** The authors present the case of a 50-year-old woman with inflammatory stenosis of the terminal ileum due to Crohn's disease. The patient underwent a laparoscopic ileocecal resection, which was complicated by a small anastomotic dehiscence with localized peritonitis. Several perforations and dehiscences were observed and necessitated an end ileostomy and an open abdomen treated with negative pressure wound therapy. Multiple surgical interventions in the abdomen were performed and negative pressure was maintained until all fistulas were sealed and granulation tissue formed. Patient was discharged after 134 days of hospitalization with both the abdomen and the ileostomy closed. After several months, a hernia repair was performed with bilateral component separation and polypropylene mesh without complications. **Conclusions.** Anastomotic dehiscence after intestinal resection can lead to an abdominal catastrophe. Severe peritonitis with enteric fistulas and an open abdomen demands a multidisciplinary approach. Negative pressure wound therapy and nutritional support are key treatments. In these patients, stoma closure and abdominal wall reconstruction after recovery from the acute event represents another surgical challenge.

Crohn's disease is a chronic, transmural, and discontinuous inflammatory process that can affect any part of the gastrointestinal tract from mouth to anus and may be associated with extraintestinal manifestations. The cumulative probability of patients undergoing surgery is about 10% to 14% and 18% to 35% after 1 year and 35 years, respectively.<sup>1</sup> Surgery is necessary to treat complications that do not resolve with medical therapy. Stenosis with obstructive symptoms is the most common indication for surgery in small bowel and ileocolic Crohn's disease.<sup>2</sup> An estimated 5% to 15% of patients will have enteroenteric fistulas.<sup>3</sup>

Surgery in Crohn's disease can be one of the more technically difficult cases for any surgeon due to the chronic proinflammatory response and the frequency of complications. Anastomotic dehiscences, abscesses, and fistulas are life-threatening conditions that require an intensive care management; sometimes a laparotomy is needed. The open abdomen is an option for patients with severe peritonitis and septic shock under some circumstances such as severe physiological derangement, deferred intestinal anastomosis, or a planned second look. The risk of abdominal compartment syndrome also is an indication for open abdomen. The rationale for using an open abdomen is to treat the infected peritoneal cavity, such as an open abscess.

The development of an enteroatmospheric fistula, which is an enteric fistula in the middle of an open abdomen, is a major concern in patients with an open abdomen. The incidence varies from 4.5% to 25% in the trauma setting and from 5.7% to 17.2% in nontrauma patients.<sup>4</sup> Many factors may contribute to the development of enteroatmospheric fistulas: lack of overlying soft tissue, poor blood supply with impaired healing, and additional disruptions. Spontaneous closure is rare.<sup>4</sup> Di Saverio et al<sup>5</sup> proposed a classification based on anatomic location (proximal/distal), fistula output volume (low/moderate/high), and location in the open abdomen. Distal and low-output fistulas have a higher spontaneous closure rate than those that are more proximal and with high output.<sup>5</sup>

The acute management of enteroatmospheric fistulas in these patients consists of stabilizing and optimizing the patient and then surgical planning. The first step involves controlling sepsis, restoring intravascular volume, controlling wound effluent, and protecting abdominal skin. Second, optimizing the patient's condition then includes assessing nutritional status and managing the abdominal wound.<sup>2,3</sup> The use of total parenteral nutrition, somatostatin and its analogues, and a proton pump inhibitor can be effective in decreasing the bowel effluent. Negative pressure wound therapy (NPWT) is a useful method for treating abdominal wounds in these conditions.<sup>6</sup> Several techniques have been described for fistula effluent diversion.<sup>5</sup> Fistula effluent isolation is essential for proper wound healing. Finally, careful planning should evaluate the anatomy of the fistula and assess the presence of disease in the rest of the gastrointestinal tract. Definitive management of enteroatmospheric fistulas should be delayed until the patient has recovered and the wound is completely healed.

## CASE REPORT

The authors present the case of a 50-year-old woman with ileal Crohn's disease, treated for the last 5 years with corticosteroids, sulfasalazine, and biological agents, as well as idiopathic thrombocytopenia and hypocoagulation by pulmonary thromboembolism. In order to treat a terminal ileum stenosis, surgery was proposed. Complementary studies (magnetic resonance enterography and colonoscopy) did not show inflammatory activity in other parts of the gastrointestinal tract.

She was admitted to the hospital where she underwent a laparoscopic ileocecal resection with an extracorporeal side-to-side mechanical anastomosis. On the third day after surgery, the patient presented with hypotension, tachycardia, fever, leukopenia, and acute renal failure. An emergency

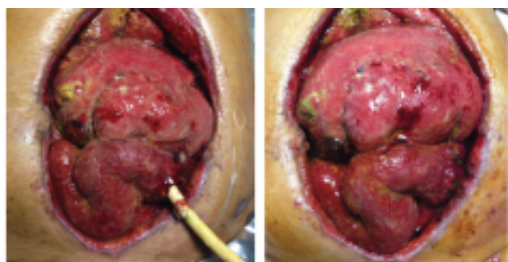
laparotomy found a small anastomotic dehiscence with localized peritonitis. To treat this complication, a complete right hemicolectomy was carried out. After this second surgery, the patient was admitted to the intensive care unit (ICU).

On her sixth day in the ICU (day 10 post admission), her clinical condition worsened (again with hypotension and fever) with elevated inflammatory markers. A re-intervention revealed 2 small intestine perforations with fecaloid peritonitis, probably related to previous manipulation. The chosen treatment was an enterorrhaphy associated with NPWT with a foam-based dressing kit (RENASYS; Smith & Nephew, Hull, UK) under continuous pressure at -90 mm Hg. On day 16 post admission, the patient presented enteric drainage from the dressing caused by an ileocecal anastomotic dehiscence. The anastomosis and 50 cm of ileum were resected, and an end ileostomy was created (**Figure 1**).



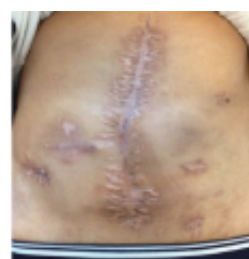
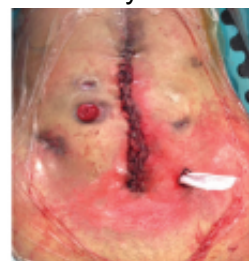
Figure 1. An end ileostomy and a laparotomy

The dressing was changed and adjusted to the conditions of the wound bed every 72 hours or earlier if the vacuum was lost. At day 25 post admission, 1 fistula in the small intestine was noted due to dehiscence of the previous enterorrhaphy. A Pezzer drain was inserted into the fistula tract (**Figure 2**). Ten days later, the patient presented with another fistula from the colic stump and another Pezzer drain was placed. During this time, she received parenteral nutrition; her general condition gradually improved and she recovered from cardiac and renal dysfunctions. Eleven revisions in about 20 days were performed until all fistulas were sealed and a granulation layer was formed (**Figure 3**). The edges of the wound were approximating with maintained negative pressure until it fully closed at day 67 post admission. Six revisions were performed after the granulation layer was formed and the definitive closure. No other device was applied to reduce tension in the wound.



On day 67 post admission, the abdomen was closed (**Figure 4**). Patient recovery was complicated by a tracheoesophageal- cutaneous fistula caused by prolonged tracheostomy (4 weeks after removing tracheostomy) and was solved by surgical approach about 3 weeks later. By day 88 post admission, the stoma was closed with a side-to-side ileocolic anastomosis. She was discharged on day 134 post admission; full recovery of her overall clinical condition was achieved after 1 year of rehabilitation due to ICU-associated myopathy.

Twenty months after discharge, the patient was admitted for an incisional hernia repair with a bilateral component separation. After isolating the hernia sac, the rectus posterior sheath was everted and sutured, and a polypropylene mesh overlay was placed. The postoperative period was uneventful. During the 2 years' follow-up, the patient continued medical therapy with 40 mg of adalimumab every 2 weeks with no recurrence of the disease (**Figure 5**).



## DISCUSSION

Anastomotic leaks account for a quarter of all deaths following colorectal surgery.<sup>7</sup> Alves et al<sup>7</sup> showed the importance of a timely diagnosis correlated with an increase in mortality rate from 0% to 18% when the diagnosis was made

after the fifth day postoperatively. Secondary peritonitis occurs in 12% to 16% of patients undergoing elective abdominal operations.<sup>8</sup>

Studies<sup>9,10</sup> have shown a high risk of intraabdominal septic complications in patients with Crohn's disease. Some more specific factors include a hand-sewn anastomosis, end-to-end anastomosis, histologic positive margins, penetrating type, and the need for sigmoid resection.<sup>11,12</sup> It is almost impossible to achieve grossly histologic negative margins. A soft and thin mesentery is a good point for resection.

The only apparent difference regarding anastomotic leak in patients with Crohn's disease was seen in ileocolic leaks, where resection and end ileostomy had far superior results in mortality (0% vs. 21%) and disease recurrence (0% vs. 57%) compared with resection with primary anastomosis.<sup>13</sup>

The treatment of abdominal sepsis comprises a rapid sequence of steps: resuscitation, antimicrobial therapy, and surgery. Surgery remains the cornerstone for the treatment of anastomotic failure with sepsis; source control and prevention of an ongoing infection are its main goals.

The patient described herein presented with a small leak in the ileocolic anastomosis. Since the peritonitis was localized and minimal, the authors decided to carry out a resection and reanastomosis. However, she had small bowel perforations and significant anastomotic dehiscence 6 days later. Diversion should be considered in patients with septic shock and extensive inflammatory process or diffuse peritonitis.<sup>14</sup>

For a patient in a critical condition and a second or third laparotomy, closing the abdominal wall may be impossible. Negative pressure wound therapy is used to speed up the development of granulation tissue, accelerate wound edge contraction, and control drainage.<sup>15</sup> The development of enteroatmospheric fistulas alter the healing process, making it much more challenging. Several creative techniques for wound management are described in the literature in order to deal with these adversities.<sup>16,17</sup> In this case report, with the use of a Pezzer drain, it was possible to close all of the enteric fistulas and continue NPWT. Due to the inflammatory process, the use of drains in the small intestine carries the risk of dehiscence and persistence of the fistula. However, the drains were the only way the authors found that would allow the NPWT dressing to remain intact; the dressing kit used has a nonadherent layer under a polyurethane foam. Several techniques have been described to divert fistula output, protect the surrounding viscera, and promote granulation.<sup>5,16</sup> In some distal, small, and low-output fistulas, primary closure can be attempted with sutures and sealants such as fibrin glue. In the case presented herein, the main goal was diverting the effluent due to the presence of peritonitis. Di Saverio et al<sup>5</sup> described a baby bottle nipple diversion that could help the technique used; its greatest advantage is better isolation of the fistula mouth.

Although the most efficient temporary abdominal closure techniques are NPWT kits combined with a dynamic closure procedure (eg, mesh-mediated traction), sepsis and enteric fistulas contraindicate the use of a mesh. In this case, it was possible to successfully close the abdominal wall without a mesh. Fascia should be closed as soon as possible (within 7 days) if the source control has been reached with sepsis control.

After a critical condition with an open abdomen and enteroatmospheric fistula, the stoma closure should be performed at least 6 months after a period of watchful waiting, allowing the inflammatory intra-abdominal process to improve.<sup>18</sup> In this case, it was possible to close the ileostomy before discharge after considering the favorable evolution of the clinical status of the patient. The development of an incisional hernia is a well-known consequence after abdominal sepsis in an open

abdomen. Component separation is not recommended in fascial temporary closure. In a complicated open abdomen with enteroatmospheric fistula, a skin graft or skin closure should be considered only after a planned hernia repair.<sup>4</sup>

After several months of recovery and follow-up, it was possible to perform an incisional hernia repair with a wall component separation technique and a polypropylene mesh. Without the component separation technique, it would not have been possible to correct the hernia since the defect in the fascia was large.

## CONCLUSIONS

This report represents an extreme case of daily challenges and complications after abdominal surgery with the need to use several techniques and critical care assessments. The rarity of this condition makes it difficult to create guidelines or algorithms. As previously discussed, Di Saverio et al<sup>5</sup> proposed a flowchart to deal with enteroatmospheric fistulas. The first step is thorough classification to allow the choice of the appropriate treatment technique. In addition, these clinical conditions require intensive care with special attention to inflammatory response and nutritional support. In most cases, decisions are made daily through patient evolution. There is no single ideal technique for all situations; a rational and multidisciplinary approach is needed.

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